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## Attribution of Mild Cognitive Impairment Etiology in Patients and Their Care-Partners

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### Abstract

**Objective**—This study examined the attribution of MCI etiology assigned by individuals with MCI and their care-partners, and the extent to which the dyads agreed on the attribution of MCI etiology.

**Methods**—We conducted secondary analyses of cross-sectional data from a cohort of individuals with MCI (n=60) and their care-partners (n=60). The mean age of the individuals with MCI was 71.0±9.4 and of care-partners 64.2±11.0 years. The primary outcome was attribution assigned to memory deficits on the Illness Perception Questionnaire. We categorized the attribution of MCI etiology as either potentially controllable or uncontrollable factors. We described the distribution of MCI etiology with descriptive and contingency tables. We determined the odds of a patient or care-partner choosing one type of MCI etiology over another.

**Results**—Although individuals with MCI and their care-partners most frequently attributed MCI to uncontrollable factors (81.7% and 61.0%, respectively), care-partners were 28.41 [95% CI, 1.26 to 645.48] times more likely to attribute MCI etiology to potentially controllable factors than individuals with MCI. No significant associations between demographic factors and attribution of MCI etiology were found for the individuals with MCI or the care-partners.

**Conclusion**—Findings demonstrated that members of the dyad attributed MCI etiology to different causes. Attributions of MCI etiology should be explored by professionals to clarify misconceptions and potentially improve subsequent voluntary actions intended to assist oneself or others.

### Keywords

Mild Cognitive Impairment; adjustment; coping; caregivers

## INTRODUCTION

Mild Cognitive Impairment (MCI) is considered an intermediate state between the cognitive changes experienced with aging and the early clinical features observed in dementia (Gauthier *et al.*, 2006). Approximately 16% of older adults ( > 70 years old) demonstrate

MCI (Petersen *et al.*, 2010). Estimates for conversion to dementia and Alzheimer's disease vary depending on the sampling method used in the study. For example, in community settings, approximately 5% of individuals with MCI converted annually to dementia (Mitchell and Shiri-Feshki, 2009). However, rates as high as 80% converting from MCI to dementia over a 6 year period were reported in a clinical sample (Petersen *et al.*, 1999). Research on MCI has primarily focused on predictors, diagnostic techniques, and prevention (Roberts *et al.*, 2010; McIlvane *et al.*, 2008). Little research has addressed the psychosocial influence of, or adjustment to, the diagnosis for individuals with MCI and their care-partners (individuals primarily available for assistance; Peterson, 2004).

Beliefs concerning the attribution of MCI etiology may be important for researchers and clinicians to understand, since beliefs about disease causality can influence emotional responses and subsequent health behaviors (Weiner, 1985; Weiner 1986). Studies that have examined attribution of dementia etiology report that attribution is related to negative psychological outcomes (Cohen and Eisdorfer, 1988; Pagel *et al.*, 1985). Pagel, Becker, and Coppel demonstrated that loss of control and attribution of dementia etiology significantly predicted depressive symptom levels in caregivers of individuals with dementia (Pagel *et al.*, 1985). In addition, attributions of disease etiology in other medical conditions (e.g., heart disease) have predicted behavior changes, such as changes in diet and exercise (French *et al.*, 2001). These findings suggest that attribution of MCI etiology may similarly influence psychological outcomes and subsequent voluntary actions intended to assist oneself or others.

Attribution theory suggests that locus of control, meaning whether the cause resides within or outside the individual's control, is a main type of causal attribution (Weiner, 1985; Weiner 1986). Using locus of control as a guiding principle, one's beliefs about the etiology of MCI may be categorized into two broad domains: 1) uncontrollable factors, like heredity or normal aging, and 2) potentially controllable factors, like stress level or lifestyle choices. Comparing attributions of MCI etiology through uncontrollable or potentially controllable factors requires further examination. A comprehensive understanding of attribution of MCI etiology may be useful for professionals in the design of educational and intervention programs for individuals with MCI and their care-partners, especially as they initiate new daily habits and routines (Weiner, 1985; French *et al.*, 2001).

One descriptive study examined 30 individuals' beliefs about MCI (Lin *et al.*, 2012). The researchers reported that individuals with MCI attributed MCI etiology to uncontrollable factors (e.g., aging, heredity, and abnormal brain changes). They also found that the individuals with MCI felt the disease was chronic and potentially controllable. Yet, beliefs regarding the negative consequences of MCI were not consistent among participants. As a result of these findings, the authors suggested that individual misconceptions about MCI should be identified and addressed with appropriate interventions. Since this one study, no studies have confirmed attributions of MCI etiology in a larger sample, nor have they examined MCI attribution etiology in care-partners of individuals with MCI.

The primary purpose of this study is to describe the attribution of MCI etiology assigned by individuals with MCI and their care-partners, and the extent to which the dyads (individual with MCI and care-partner) agree on the attribution of MCI etiology. The secondary aim is to explore demographic factors that influence attribution of MCI etiology.

## METHODS

Data were collected as part of a cohort study examining how individuals with MCI and their care-partners make sense of, or come to terms with, their symptoms and diagnosis.

Recruitment and data collection procedures have been reported elsewhere (Morgan *et al.*, 2012). Briefly, participants were recruited from the University of Pittsburgh Alzheimer Disease Research Center (ADRC). Individuals with MCI were included if they: (1) held an ADRC consensus diagnosis of MCI, (2) were greater than 50 years of age, (3) were community-dwelling, and (4) provided written-informed consent to participate. Care-partners were included if they: (1) were 18 years of age or older, (2) were a relative or kin-like friend who the participant with MCI identified as his or her primary care partner, and (3) provided written informed consent to participate.

Individuals with MCI completed multidisciplinary evaluations to receive their consensus diagnosis of MCI (Lopez *et al.*, 2003). They, along with their families, received formal diagnostic feedback in accordance with the ADRC protocol (Lingler *et al.*, 2006). One of three neurologists and one of three social workers conducted the formal diagnostic feedback sessions. The content of the feedback sessions was standardized and included: findings from the physical and neurological examination, laboratory studies, neuroimaging studies, neuropsychological testing, and diagnostic disclosure. Educational materials on MCI from the Alzheimer's Association were distributed by the social workers at the close of each feedback session. The current study did not observe or analyze the formal diagnostic feedback sessions.

Trained research assistants conducted a standardized interview with each member of the dyad. Several precautions were taken to decrease bias. Separate research assistants simultaneously interviewed the individuals with MCI and the care-partner to minimize interviewer bias. Each interview was conducted in a private location (members of the dyad could not hear one another) to decrease respondent bias. Interviews were conducted in the same format for individuals with MCI and their care-partner (e.g., questions were read aloud and visual aids were provided) to maintain consistency among interviews and decrease respondent burden. Additionally, the research team reviewed the ADRC research record for the individual with MCI. Compensation was provided to the dyad upon completion of the assessment (\$20 per person). All procedures were approved by the Institutional Review Board.

Individuals with MCI and care-partners self-reported demographics, including age, sex, race, education, and relationship status. Characteristics of the diagnosis of MCI were retrieved from the ADRC records (e.g., type of diagnosis and duration since diagnosis).

The primary outcome measure was the Illness Perception Questionnaire (IPQ) (Weinman *et al.*, 1996). The IPQ generally assesses the ideas about an illness around five themes (i.e., identity, cause, timeline, consequences, and cure-control). The primary item used in these analyses asked participants to assign a cause for MCI. Nineteen potential options were provided, such as stress, diet, poor medical care in past, mental attitude, overwork, normal aging, alcohol, or personality. Participants had the option to write-in their own response (e.g., medical conditions).

To facilitate further analyses, we adapted the categorization scheme of developed by Anderson and colleagues (2011) to describe attributions of MCI etiology as potentially controllable and uncontrollable factors. Potentially controllable factors included stress, alcohol use, smoking, and behavior. Uncontrollable factors included heredity, normal aging, and personality. Medical conditions were kept separate, as they could be controllable (e.g., diabetes) or uncontrollable (e.g., learning disability).

We computed means and standard deviations of continuous and frequency (%) of categorical demographic variables to describe the sample. We described the distribution of

MCI etiology with descriptive and contingency tables. We determined the odds of participants to choose one type of etiology over another with an odds ratio. Subsequently, we calculated a 95% confidence interval (CI) to determine the stability of the odds ratio. A Chi-Square test for the analysis of matched pairs (McNemar-Bowker test) indicated the significance of concordance in a particular direction. Lastly, we conducted one-way analysis of variance tests for continuous variables and chi-square tests for categorical variables to explore demographic factors that may influence the attribution of MCI etiology. All statistical analyses were conducted using SPSS version 21.0 (SPSS Inc., Chicago, IL, USA).

## RESULTS

In the parent study, 62 dyads were referred to the study for screening, all were eligible, and 2 declined. All 60 dyads completed the assessment. In general the individuals with MCI were older than 65 years old, male, white, and had completed college. Care-partners were younger than 65 years old, female, white, had completed college, and were a spouse to the individual with MCI (Table 1).

Table 2 displays the attributions of MCI etiology most commonly chosen by the individuals with MCI and their care-partners. The majority of individuals with MCI attributed their memory difficulties to uncontrollable factors (81.7%). The remaining 11 individuals with MCI indicated potentially controllable factors (5.0%) or a medical condition (13.3%). Among the care-partners, 61.0% attributed MCI etiology to uncontrollable factors, 23.7% reported potentially controllable factors, and 15.3% reported medical conditions. Individuals with MCI and their care-partners most commonly attributed MCI etiology to heredity and normal aging, both of which are uncontrollable factors. Within the potentially controllable factors, stress or worry and family problems or worries were mostly commonly attributed to MCI etiology. Care-partners also reported various lifestyle behaviors as potential attributions of MCI etiology (e.g., alcohol use, smoking, and dietary habits).

Despite the high frequency of attribution to uncontrollable factors, care-partners were 28.41 times more likely to attribute MCI etiology to a potentially controllable factor than individuals with MCI. The 95% confidence interval of the odds ratio [1.26, 645.48] indicated that the odds of attributing MCI etiology to a potentially controllable factor was significantly higher for care-partners compared to individuals with MCI.

Table 3 is a contingency table that summarizes the counts of individuals with MCI and care-partners that attributed MCI etiology to controllable, potentially uncontrollable factors, and medical conditions. One care-partner did not complete the IPQ; their attribution of MCI etiology could not be compared to the attribution reported by the individual with MCI. Thus, 59 dyads were included in the contingency table. Forty dyads were concordant in the attribution of MCI etiology chosen. Among all dyads, 57.6% attributed MCI etiology to an uncontrollable factor, 5.1% chose potentially controllable factors, and 5.1% chose medical conditions. On the other hand, 32.29% of the dyads were discordant in the attribution of MCI etiology. Among the discordant dyads, 14 individuals with MCI attributed MCI etiology to an uncontrollable factor whereas the care-partners attributed MCI etiology to a potentially controllable factor or a medical condition. The McNemar-Bowker test indicated that a significant difference among the attributions of MCI etiology was chosen by the individuals with MCI and their care-partners ( $p = 0.005$ ). Care-partners were more likely to attribute MCI etiology to a potentially controllable factor.

We examined demographic factors (age, sex, race, education, relationship to individual with MCI, and time since diagnosis) that may have influenced attribution of MCI etiology

chosen. No significant associations between demographic factors and attribution of MCI etiology were found for the individuals with MCI or the care-partners.

## DISCUSSION

We examined the attribution of MCI etiology by individuals with MCI and their care-partners. Individuals with MCI and their care-partners most frequently attributed uncontrollable factors to MCI etiology. However, the distribution of attribution chosen differed significantly between the two groups. This suggests that after diagnosis of MCI, individuals with MCI and their care-partners may not agree on the cause of the cognitive changes. The attribution identified, and the agreement within the dyad, are important as they may influence psychological outcomes, engagement in interventions, and subsequent health behaviors demonstrated by the members of the dyad (Weiner, 1985; Weiner, 1986, Cohen and Eisdorfer, 1988; Pagel *et al.*, 1985; French *et al.*, 2001).

Individuals with MCI and their care-partners were able to report their beliefs about MCI. Both groups most commonly thought the cognitive changes were the result of uncontrollable factors, such as heredity or normal aging. These findings are consistent with a previous study that reported that individuals with MCI most commonly endorsed aging and hereditary factors as the possible causes of MCI (Lin *et al.*, 2012).

While uncontrollable factors were most commonly attributed to MCI etiology, individuals with MCI and their care-partners differed in the frequency of choosing uncontrollable or potentially controllable factors. Individuals' with MCI more frequently attributed MCI etiology to uncontrollable factors (e.g., heredity) than their care-partners. Care-partners, in the sample, were more likely to attribute MCI etiology to potentially controllable factors (e.g., stress or lifestyle behaviors). These differences in attribution of MCI etiology highlight differences in locus of control perceived by the individual with MCI and their care-partners (Weiner, 1985). Whether an individual attributes MCI etiology to a potentially controllable or uncontrollable factor may influence psychological outcomes such as depressive symptom levels (Pagel *et al.*, 1985). The potential negative outcomes suggest that professionals should explore attributions of MCI etiology chosen by both members of the dyad. Identification of attribution assigned to MCI could provide an opportunity for professionals to clarify overt misconceptions members of the dyad may have. Clarification of misconceptions may be especially important to maximize engagement in interventions, as previous research has suggested that attributions associated with medical conditions are predictive of behavior changes (French *et al.*, 2001).

While these findings provide insight into the attribution of MCI etiology assigned by individuals with MCI and their care-partners, results should be interpreted with caution. This study used a small and select sample of individuals with MCI and their care-partners who were seeking information about their cognitive status. The sample was primarily white and well-educated. Thus, the sample may not generalize to all individuals with MCI and their care-partners. This study relied on the ADRC protocol for formal diagnostic feedback. Individual specific deviations from the protocol are not captured in this study. Also, the categorization scheme used for coding causal factors as potentially controllable is not definitive; it is one of several possible approaches to coding beliefs about MCI etiology. Other categorization schemes should be explored in future studies.

While this study has limitations, it is the largest sample of individuals with MCI and their care-partners to explore attribution of MCI etiology. Future studies should expand on these findings and examine attribution of MCI etiology using large, representative samples of individuals with MCI and their care-partners, including more racial and education diversity.

Future studies should also determine how MCI attributions influence subsequent health behaviors.

## CONCLUSION

Findings from the current study, and future larger studies, are key to appropriately developing educational materials, resources, and interventions to support individuals with MCI and their care-partners. Results from this study clearly suggest that members of the dyad attribute MCI etiology to different causes which may influence their psychological outcomes, participation in interventions and subsequent voluntary actions intended to assist oneself or others. More information is needed to understand the emotional responses and experience of individuals with MCI and their care-partners as they embark on an uncertain future.

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**Key points**

1. Individuals with MCI and their care-partners most frequently attributed MCI etiology to uncontrollable factors.
2. However, care-partners in the sample were more likely to attribute MCI etiology to potentially controllable factors (e.g., stress or alcohol) than individuals with MCI.
3. Professionals should identify attribution assigned to MCI and clarify misconceptions among members of the dyad.



**Table 1**

## Sample Characteristics (N = 60)

<b>Individual with MCI</b>	<b>n (%) or M ± SD</b>
Age in years (range = 50–89)	71.0±9.4
Sex, % men	36 (60.0)
Race, % White	55 (91.7)
College	42 (70.0)
Amnesic MCI diagnosis	48 (80.0)
Duration of diagnosis (months)	3.6±4.0
<b>Care-Partner</b>	
Age in years (range = 29–84)	64.2±11.0
Sex, % women	44 (73.3)
Race, % White	55 (91.7)
College	38 (63.3)
Relationship to individual with MCI, % spouse	45 (75.0)

Note: MCI = mild cognitive impairment

**Table 2**

## Attributions of MCI Etiology Most Commonly Reported

	Individual with MCI		Care-Partner	
	Attribution	n (%)	Attribution	n (%)
<b>Uncontrollable Attributions</b>	Heredity	24 (40.0)	Heredity	20 (33.9)
	Normal Aging	16 (26.7)	Normal Aging	10 (16.9)
<b>Potentially Controllable Attributions</b>	Stress or Worry	2 (3.3)	Family problems or worries	5 (8.5)
			Stress or worry	3 (5.1)
			Alcohol	2 (3.4)
<b>Medical Condition</b>	Medical Condition	8 (13.3)	Medical Condition	9 (15.3)

**Table 3**

Attribution of MCI Etiology (N=59)

		Care-Partner			Total
		Uncontrollable	Potentially Controllable	Medical Condition	
<b>Individual with MCI</b>	Uncontrollable	34	8	6	48
	Potentially Controllable	0	3	0	3
	Medical Condition	2	3	3	8
	<b>Total</b>	36	14	9	59

Note: MCI = Mild Cognitive Impairment